typical members of the genus in exhibiting "a series of scutes similar to those on the abdominal profile between the occiput and the dorsal" fin. He points out, moreover, that this feature is peculiar to "all the freshwater and estuary non-migratory Herrings of the cismontane rivers of the Colony, between the limits of the Richmond River and Botany Bay;" while he finally observes that the presence of the dorsal scutes may perhaps be regarded as separating the species in question from the genus *Clupea*, in which case he proposes the new name of *Hyperlophus*.

If Mr. Ogilby had not shared in that lamentable ignorance of extinct animals so conspicuous in a certain school of zoologists, he might have been spared the discussion of a point that was settled more than fifteen years ago; and, instead of adding to the burden of synonymy, he might have been able to contribute an item to the broad philosophy of the subject. As a matter of fact, the doubly-armoured herrings were discovered in 1877 by Professor E. D. Cope*, who established for them the genus *Diplomystus*—a genus now so widely recognized that it has already found a place in the elementary handbooks †.

Now the great interest of Mr. Ogilby's observation lies in the circumstance that *Diplomystus* is one of the earliest known types of herring, having a very wide range in space during the latter part of the Cretaceous and the early part of the Tertiary period. It was evidently a characteristic fish of those times, and no trace of the genus at a later period seems to have been recorded until the publication of Mr. Ogilby's recent paper. It has been discovered in the Upper Cretaceous of Brazil and of Syria; in the Eocene of Wyoming, U.S.A.; and in the Oligocene of the Isle of Wight. It is most abundantly represented in the Green River Shales of Wyoming ‡, and some species exhibit the remarkably forward pelvic fins observed in the new herring from New South Wales. The occurrence of *Diplomystus* at the present day in the freshwaters of Australia, is thus another interesting case of the survival of ancient types in remote places of refuge; and it might be profitable to institute a detailed comparison between the other freshwater Teleostean fishes of Australia and their extinct allies occurring in other parts of the world.

The Development of the Gemmules of Ephydatia fluviatilis, *Auct.*

By W. Zykoff, of Moscow.

While at present engaged in preparing for the press a detailed article on the development of *Ephydatia fluviatilis*, Auct., I see a

* Bull. U.S. Geol. Surv. Territ. vol. iii. p. 808.

† Zittel, Handb. Palæont. vol. iii. p. 276; Nicholson & Lydekker, Palæont. vol. ii. p. 996.

‡ E. D. Cope, Rep. U.S. Geol. Surv. Territ vol. iii. pp. 73–79, with plates.

possibility of briefly communicating the results at which I have arrived during my investigation of this question.

1. The appearance of the glistening granules (yolk-substance) in the ordinary amœboid cells must be regarded as the earliest stage in the development of the gemmules.

2. These cells with the glistening granules ("trophophores" of Marshall *) begin to glide towards one another, while they are joined by a fairly large number of ordinary parenchyma cells.

3. Notwithstanding the assertions of Gœtte †, neither the ciliated chambers nor the canals take part in the development of the gemmules.

4. The cells which have glided together unite, and form a small spherical lump, the central mass of the future gemmule, around which the parenchyma cells group themselves in several concentric rows.

5. The number of the glistening granules in the cells of the central mass increases visibly, so that the ordinary parenchyma cells which were at first observed between those cells completely disappear.

6. The peripheral cells of the parenchyma, which group themselves concentrically around the central mass, gradually assume a clavate form and arrange themselves radially, as was perfectly correctly described by Gœtte.

7. Moreover these cells group themselves into one, and not into from two to three layers, as Gœtte maintains, and that, too, not simultaneously over the entire surface of the future gemmule.

8. The lower expanded disciform ends of the clavate cells secrete a chitinoid cuticle, the first internal layer of the future shell of the gemmule, as is quite correctly stated by Gœtte.

9. There is no "enveloppe primitive" around the central mass of the future gemmule, as described by Wierzejski ‡.

10. Amphidiscs are not formed in the clavate cells of the shell of the gemmules, as is described and figured by Gœtte §.

11. The amphidiscs appear outside these cells, exactly as described by Wierzejski; and moreover they group themselves in concentric zones around the clavate cells.

12. I have succeeded in observing amphidiscs from the earliest stages of their development until they were fully formed, and I always found them outside the clavate cells.

* W. Marshall, "Vorläufige Bemerkungen über die Fortpflanzungsverhältnisse von *Spongilla lacustris*," Sitzungsberichte der naturforsch. Gesellschaft zu Leipzig, 1884.

† A. Gœtte, 'Untersuchungen zur Entwicklungsgeschichte von *Spongilla fluviatilis*,' 1886.

‡ A. Wierzejski, "Le développement des gemmules des éponges d'eau douce d'Europe," Archives slaves de Biologie, t. i. 1886, f. 8.

§ *Loc. cit.* Taf. v. figs. 35 & 36.

13. The amphidises gradually penetrate into the layer of the clavate cells, and distribute themselves between them.

14. The cells which are displaced by the amphidises emerge upon the surface of the latter, and secrete the second chitinoid cuticle, whereupon they atrophy, and the gemmule appears in its completely developed state, as previously described by Gœtte and Wierzejski.

Finally one little remark in conclusion: Gœtte's assertion that the clavate cells of the gemmule in process of formation form amphidises in their interior, appears to me to be at once improbable, for the very reason that in such a case we would have to ascribe a double *rôle* to one and the same cell; *i. e.* the faculty of secreting (1) chitin with their lower flattened end, and that, too, twice over; and (2) silica for the formation of the amphidises. So far as I am able to judge, there is no instance of the assumption by one and the same cell of such different chemical functions.—*Zoologischer Anzeiger*, xv. Jahrg., No. 386, March 14, 1892, pp. 95–96 (sent in Dec. 14, 1891).

On the Habits of Gelasimus annulipes, *Edw.*

By A. Alcock, M.B.

Darwin, in the 'Descent of Man,' quotes several observations which illustrate the considerable complexity of life of *Gelasimus*. He refers (2nd edition, pp. 254, 269, and 271) to Fritz Müller's account of Brazilian species of the genus in which the males are more numerous than the females, in which the pugnacity of the males is remarkable, and in which the male exhibits a chameleon-like attractiveness of colour not possessed by the female. He also refers to Milne-Edwards's quotation (Hist. Nat. des Crustacés, tom. ii. p. 50), that the male and female of a species of *Gelasimus* live together in one burrow, the mouth of which the male closes with his enormous chela.

The observations which I have to record are on the common species *Gelasimus annulipes*, Edw.

This species lives in vast swarms in "warrens" on the muddy tidal swamps of the Godávari and Kistna, each individual having its own burrow, round which it ranges, and into which it retreats when alarmed.

In the colder months, at any rate, the males far outnumber the females.

In the male alone one of the chelæ is enormously developed. In a fully adult male the length of the large chela is two-and-a-half times the greatest length, and one-and-a-half times the greatest breadth, of the whole body, and 40 per cent. of the entire weight of the animal, and is coloured a beautiful cherry-red fading to a rose-pink,